

REMARKS

Attached hereto is a marked-up version of the changes made to the claims by the current amendments. The attached pages are captioned "Version with Markings to Show Changes Made."

Allowable Subject Matter

Applicants gratefully acknowledge allowability of claim 30. Regarding the election of species, Applicants had elected to prosecute the invention of generic claims 1-4 and the first species encompassed by claims 5-13, but respectfully request that the claims drawn to the first and second species be rejoined upon indication of allowability of the generic claim 1.

Claim Rejections - 35 USC § 102

Claims 1, 2 and 4-11 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,512,131 to Kumar et al. (here after Kumar et al.).

Applicant has amended claim 1 by incorporating claim 23 into claim 1 to indicate that the thin film layer is not a self-assembled monolayer, but that the thin film is rather a thin film of an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, or a mixture thereof.

Kumar et al. disclose a method of forming a patterned thin film comprising the steps of:

- (1) providing a substrate having a patterned layer of a self-assembled monolayer (SAM) thereon; and
- (2) depositing a second self-assembled monolayer (SAM) thereover.

In contrast to Kumar et al., instant claim 1 defines a method in which **a thin film material** is deposited on a surface of a substrate having thereon a patterned underlayer of a self-assembled monolayer. **The thin film in claim 1 is not a self-assembled monolayer**. Instead, the thin film is clearly described to be a thin film of “an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof.” (see claim 1, as amended).

The method of Kumar et al. **always deposits a second self-assembled monolayer (SAM)** over a first self-assembled monolayer (SAM), a feature that is not present in instant claim 1.

The thickness of the patterned thin film material can be controlled by choosing the concentration of the thin film material or its precursors in the solution and the rate of revolution of the spinning substrate. In immersion-coating, the thickness of the patterned thin film material can be controlled by choosing the concentration of the thin film material or its precursors in solution and the rate of substrate removal from solution (for example, see pages 23-24, of the specification). These are thin films, not self-assembled monolayers (SAMs).

Accordingly, claim 1, and claims 2 and 4-11, which depend directly or indirectly from claim 1, clearly distinguish over Kumar et al. Therefore, the rejection of claims claim 1, 2 and 4-11 under 35 U.S.C. § 102(b), as being anticipated by Kumar et al. should be withdrawn.

Claim Rejections - 35 USC § 103

Claim 3 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,512,131 to Kumar et al.

The Office Action concedes that Kumar et al. does not specifically disclose, as per applicant claim 3, that the substrate can be an irregularly shaped substrate, stating that it would have been obvious to utilize the method of Kumar et al. to pattern a substrate having an irregular shape.

Applicants would like to point out that claim 3 depends from claim 2, which, in turn, depends from claim 1, thereby incorporating all the limitations of claims 2 and 1. Applicants have amended claim 1 by incorporating claim 23 into claim 1 to indicate that the thin film layer is a thin film of: an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, or a mixture thereof, **not a self-assembled monolayer**.

Kumar et al. disclose a method of forming a patterned thin film by: (1) providing a substrate having a patterned layer of a self-assembled monolayer (SAM) thereon; and (2) depositing **a second self-assembled monolayer (SAM)** thereover.

In contrast to Kumar et al., instant claim 3 defines a method in which **a thin film material** is deposited on a surface of a substrate having thereon a patterned underlayer of a self-assembled monolayer. **The thin film in claim 3 is not a self-assembled monolayer**. Instead, the thin film material is clearly described to be as follows: "an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof."

The method of Kumar et al. **always deposits a second self-assembled monolayer (SAM)** over a first self-assembled monolayer (SAM), a feature that is not present in instant claim 3. There is no teaching or suggestion in Kumar et al. to deposit a thin film of an organic molecule, a short-chain organic oligomer, a long-chain organic

polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof. Instead, Kumar et al. teaches to deposit a second self-assembled monolayer (SAM) over a first self-assembled monolayer (SAM), a feature that is not present in instant claim 3. Accordingly, all the elements of instant claim 3 are not present in Kumar et al.

To establish a *prima facie* case of obviousness, all the elements of a claim must be present or described in a cited reference with a suggestion to modify the reference to arrive at the claimed invention. A teaching or suggestion of how to modify the reference to arrive at the claimed invention is one of the essential requirements that must be met to establish a *prima facie* case of obviousness (see MPEP § 2142 and *In re Rouffet*, 47 USPQ 2d at 1457-1458).

The method of Kumar et al. always deposits **a second self-assembled monolayer (SAM)** over a first self-assembled monolayer (SAM), a feature that is not present in instant claim 3.

There is no teaching or suggestion in Kumar et al. to modify the method of Kumar et al. by depositing a thin film of an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof, on a surface of a substrate having thereon a patterned underlayer of a self-assembled monolayer instead of depositing a second self-assembled monolayer (SAM) over a first self-assembled monolayer (SAM).

Accordingly, the criteria for establishing a *prima facie* case of obviousness have not been met (see MPEP 2143, citing *In re Vaeck*, 947 F.2d 488, 20 USPQ 2d 1438 (Fed. Cir. 1991)). Therefore, the rejection of claim 3 under 35 U.S.C. § 103(a), as

being obvious over U.S. Patent No. 5,512,131 to Kumar et al. is improper and should be withdrawn.

Claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,512,131 to Kumar et al. in view of U.S. Patent No. 6,020,047 to Everhart and U.S. Patent No. 5,059,258 to Wefers et al.

The Office Action states that Kumar et al. “disclose a method for the formation of a patterned thin film on a substrate having a patterned SAM underlayer”. This statement is incorrect. Kumar et al. discloses **depositing a second self-assembled monolayer (SAM) over a first self-assembled monolayer (SAM)**. This is a feature that is not present in instant claim 13.

Claim 13 depends from claim 5, which, in turn, depends from claim 1, thus incorporating all the limitations of claims 5 and 1. Applicants have amended claim 1 to indicate that the thin film layer is a thin film of an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, or a mixture thereof, **not a self-assembled monolayer**.

Thus, claim 13 describes a method of forming a patterned thin film of an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof. on a substrate having a patterned SAM underlayer.

Wefers et al. discloses the use of phosphonic species in the formation of SAMs on oxidized metal substrates. However, Wefers et al. **does not** disclose a method for the formation of a patterned thin film of an organic molecule, a short-chain organic

oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof, on a substrate having a patterned SAM underlayer.

Everhart discloses a film with patterned self-assembling monolayers on a polymer film coated with a metal alloy. However, Everhart **does not** disclose a method of forming a patterned thin film of an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof, on a substrate having a patterned SAM underlayer.

Thus, neither Kumar et al. nor Wefers et al. nor Everhart, either alone, or in combination, teach or suggest all the elements of the instant claim 13, nor do they teach or suggest how to modify one or more of the other references to arrive at the instantly claimed invention. Without such a teaching or suggestion, a person of ordinary skill in the art would not be motivated to combine the references.

Due to the dependence of claim 13 from claim 1, even if the references were combined, the combination still does not have all the elements of claim 13, namely **forming a patterned thin film of an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof, on a substrate having a patterned SAM underlayer.**

The combination (1) does not have all the elements of claim 13, (2) does not provide motivation to modify the other reference to arrive at the claimed invention and

(3) does not provide a reasonable expectation of success to arrive at instantly claimed invention as defined in claim 13 even if all three references were combined.

Thus, none of the essential requirements to establish a *prima facie* case of obviousness have met (see MPEP § 2142 and In re Rouffet, 47 USPQ 2d at 1457-1458). Therefore, the rejection of claim 13 under 35 U.S.C. § 103(a), as being obvious over U.S. Patent No. 5,512,131 to Kumar et al. in view of U.S. Patent No. 6,020,047 to Everhart and U.S. Patent No. 5,059,258 to Wefers et al. should be withdrawn.

Based on the above, applicants respectfully request reconsideration of the present application, withdrawal of the 35 U.S.C. §102 (b) rejection and the 35 U.S.C. § 103(a) rejections and allowance of claims 1-13 and the newly presented claim 31, in addition to the allowable claim 30.

Accordingly, an early indication of the allowability of all pending claims by issuance of a Notice of Allowability is earnestly solicited.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Claim 23 was cancelled.

The claims were amended as follows:

1. (Amended) A method of forming a patterned thin film comprising:
depositing a thin film material selected from the group consisting of: an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof, on a surface of a substrate having thereon a patterned underlayer of a self-assembled monolayer.

24. (Amended) The method of claim [23]22, wherein said organic-inorganic hybrid material is selected from the group consisting of: $(C_6H_5C_2H_4NH_3)_2SnI_4$, $(C_4H_9NH_3)_2CH_3NH_3Sn_2I_7$, $(C_6H_5C_2H_4NH_3)_2CH_3NH_3Sn_2I_7$, $(H_3NC_4H_8NH_3)_2SnI_4$ and a mixture thereof.

25. (Amended) The method of claim [23]22, wherein said photoresist is a positive working, deep UV photoresist.

26. (Amended) The method of claim [23] 22, wherein said long-chain organic polymer is polymethyl methacrylate/ methyl methacrylate copolymer.

27. (Amended) The method of claim [23]22, wherein said metallo-organic complex is tin 2-ethylhexanoate.

The following new claim was added:

-- 31. The method of claim 30, wherein said thin film material is selected from the group consisting of: an organic molecule, a short-chain organic oligomer, a long-chain organic polymer, a photoresist, an organic-inorganic hybrid material, a metallo-organic complex, a nanoparticle of metal, a nanoparticle of metal oxide, a nanoparticle of semiconductor, a silica particle, an inorganic salt, and a mixture thereof, on a surface of a substrate having thereon a patterned underlayer of a self-assembled monolayer. --